far below the FCC estimate of value: $950 million (1991 assessed value) vs. a $3.06 billion FCC estimate in November 1992. LACTC claimed, however, that it's proper assessment should have been just $245 million -- the cost of its physical plant without an FCC license. The implied Q ratio, using the FCC's market value estimate and LACTC's replacement cost estimate, calculates to be 12.49.[43] It is apparent that over 90% of the value of this cellular system is attributable -- according to its owners -- to the cost of a duopoly license right. Their expert nicely explains how this could be the case:

> *It is necessary to understand how the bidder would determine the price or the recipient would determine the value of the FCC license being acquired. In either case, one would calculate the earnings from the business which can be generated under the monopoly condition. These earnings would be greater than those which could be generated under the competitive market structure and these additional earnings are the earnings associated solely with the ownership of the FCC license. The barrier to entry -- the FCC license in this case -- is a valuable intangible asset which requires a return as part of the income stream.*[44]

5 Entry is Profitable.

Yet another confirmation of the service price and system value data presented in Section 3 is that projections for market entry into duopoly cellular markets reveal high profitability avail-

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43 A similar result obtains for the wireline system. PacTel Cellular claimed that "the fair market value of PacTel's tangible property as of January 1, 1991 -- valued in place as part of a going concern -- was $300,000,000." ("In the Matter of the Petition for Reassessment of the 1991 Unitary Value of: Los Angeles SMSA Limited Partnership, dba PacTel Cellular [No. 2532], *Petition for Reassessment*, Appeal No. SAU91-040, Before the State Board of Equalization, State of California [29 July, 1991].) This reduces to $23.08 per pop, or a Q ratio of 10.2, using the FCC's $3.06 billion estimate of market value.

44 Schoenwald declaration, p. 26; emphasis in original.

able to new competitors. This indicates that the licensing barrier is restraining viable entrants who would reliably lower prices to consumers. Hence, current prices must be above competitive levels. These estimations have been conducted by both the private sector and the FCC.

5.1 Simulations.

Morgan Stanley asked the question, if a third cellular company entered the market with a 25 MHz frequency assignment, what would result in the marketplace?[45] To the surprise of no one familiar with the excitement created by the FCC's ongoing licensing of new wireless telephone markets, they found that new a competitor would be highly profitable, even if prices were to fall by more than one-third. This illuminates the extent to which the current market structure keeps prices high. As summarized by the CBO:

> *The financial simulation results show that a firm entering the land-mobile market could afford $35 to $37 a person in capital costs and initial operating losses and still make an after tax return of 13 percent to 15 percent, even with prices 35 percent below current levels and customers using 20 percent fewer minutes per month on average.*[46]

The FCC's study by Kwerel & Williams likewise projects that an additional entrant would both be profitable and lower market prices (by about 25%). In fact, they estimate that the social benefits from breaking down duopoly market structure in the cellular industry would be about $9 billion nationally.[47] This offers strong support for the data already in

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45 Greenberg & Lloyd, pp. 5-7.

46 CBO, p. 35

47 This is implied by their projection that the L.A. cellular market would experience net social benefits of $445 million should a third cellular firm enter the market, and assuming that L.A. cellular rates were only of the level existing in the typical market. (Kwerel & Williams, p. 98) Since the population of the Los Angeles' cellular market is given as 13 million, about 5% of the U.S. population, the nationwide benefits are equal to ($445 million)(20) = $8.9 billion. This estimate is conservative in that it allows the entrant only 18 MHz to compete with the cellular incumbents, each of whom uses 25 MHz.

evidence concerning capital values: Prices are far higher than competitive levels, and would both support entry, and fall with entry, if competition were allowed.

5.2 FCC Study Says Spectrum Worth More to Consumers If it Goes to Competitors.

When estimating the likely impact of entry into cellular telephone markets, Kwerel & Williams work from a framework that duopoly market power raises price significantly above competitive levels. As their base case scenario, they assume that a third cellular competitor will lower prices by 25%[48]. They estimate welfare effects flowing from new cellular entry given a range of price reductions, from 0 to 39%. Alternatively, when asking what would happen to prices if new spectrum were merely divvied up amongst the two cellular incumbents, the only two scenarios analyzed are those assuming either a 0 or a 1% price reduction (resultant from slightly lower marginal costs with more spectrum to work with).[49]

In fact, issuing more spectrum to industry incumbents lowers operating costs somewhat, but since costs are such a low proportion of overall costs, this has virtually no impact on consumers. For instance, the study estimates that if 18 MHz were made available to the existing two firms in the L.A. cellular market (9 MHz each), that either firm would pay only up to $76 million to gain such frequency use. Incumbents are assumed to be reluctant to use spectrum to expand output, as that would lower prices.

New entrants would love to acquire new spectrum so as to offer expanded service at lower prices. The authors note that, "The market value of the spectrum would be consider-

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48 They arrive at this assumption both theoretically, in the duopoly pricing model discussed above, and by reference to the empirical literature on the effect of new entry on output prices. (Kwerel & Williams, pp. 83, 86)

49 Kwerel & Williams, p. 84

ably greater if a third cellular system were permitted to bid."[50] They estimate that a third cellular company would pay up to $253 million to acquire use of the 18 MHz, even assuming a price reduction of 25%. The conclusion is clear: Entrants can profitably enter new markets at prices far lower than charged by incumbents, demonstrating that licensing barriers currently protect duopoly prices and profits.

5.3 Incumbent Cellular Operators Lobby Against PCS Allocation.

Another strong piece of evidence that cellular duopolists currently enjoy market power is given by the fierce resistance to new entry demonstrated by cellular operators. In competitive markets, incumbent operators do not have monopoly prices to protect. Moreover, the impact of new entrants is slight, as prices are already set at levels approximating unit cost. It is unlikely that a new competitor would voluntarily enter a market with the intention of pricing below costs, thereby incurring losses.[51] What the incumbents reveal when they engage in political or legal activity (lobbying, etc.) to deny entrants an opportunity to compete, is that there is something worth protecting. Just as a license to be a competitor is valueless, a truly competitive market is not worth barricading against entry.

What is clear in the current spectrum policy world is that incumbent cellular operators have argued vigorously to resist any FCC licensing of potential competitors. With respect to

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50 Kwerel & Williams, p. 86.

51 The exception that proves the rule is that entrants will enter markets and be prepared to sell at prices below prevailing unit costs when they believe they have an innovative, lower-cost production technology. Incumbents with investments in the old technology would then be frantic to resist competitive entry, even if they did not enjoy high profits. (They would seek to protect their sunk investments, or quasi-rents.) Yet, in an economic sense, they are charging supra-competitive prices, given the newly available technology. Hence, monopoly profits are sufficient incentive to resist competitive entry, but they are not necessary.

a February, 1991 FCC decision to allow Fleet Call[52] to deliver wireless telephone calls over its SMR (specialized mobile radio) airspace (5-8 MHz) in six large U.S. markets, the cellular opposition was fierce. According to Morgan Stanley, the FCC approved Fleet Call's petition "despite a massive lobbying effort mounted against it by the cellular industry. The agency had to run through a nightmare of administrative procedures to authorize Fleet Call's system... while resisting massive political pressure."[53]

Likewise in the development of personal communications networks (PCN), a wireless telephone technology competitive with cellular, which the FCC indicated it would issue licenses for in its 1990 Notice of Inquiry on the matter. The cellular telephone companies have launched a large-scale campaign to delay, hinder, or otherwise suppress the potential competition from PCN suppliers. As Derrick C. Huang writes: "because the spectrum is an insurmountable entry barrier to wireless services, incumbent users may engage in anticompetitive actions against new businesses -- cellular carriers are generally against allocation for PCN, even though their own frequencies are unlikely to be affected."[54]

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52 A company now known as Nextel.

53 Greenberg & Lloyd, p. 4. An academic researcher notes, "Fleet Call's application and the FCC's ruling received considerable attention. Before the FCC made its decision, more than twenty law firms, representing companies opposed to Fleet Call's proposals, lobbied to seek delay." (Derrick C. Huang, *Up in the Air -- New Wireless Communications* [Harvard University: Program on Information Resources Policy; February 1992], p. 48)

54 Derrick C. Huang, *Managing the Spectrum: Win, Lose, or Share* (Harvard University: Program on Information Resources Policy; September 1992), p. 39. Of course, while the cellular firms' frequencies will not be affected, their profitability will be.

In resisting entry[55], the cellular duopolists make it abundantly clear that they have much market power to protect. Certainly, industry analysts agree that fending off competition would be a wise thing to do. Morgan Stanley predicted in 1991, based on the assumption of added competition in the cellular market, that future prices could plummet:

> *The period 1996-2000 should see material price reductions as the duopolies begin to compete with the new entrants... Over the 1996-2001 period we forecast an overall rate reduction by the duopolies of 20-30% in response to the new entrants' 30-40% cheaper prices... Depending on the quality of the competitive service, further reductions by the duopolists could thus be required. As argued earlier, new entrants can keep their prices significantly lower than the existing carriers' and still earn high returns.*[56]

6 Alternative Spectrum Values.

Yet another way to infer the large duopoly rents resultant from the exercise of market power in today's cellular telephone markets is to examine what estimates are made for the value of new, competitive licenses. If prices were today set at about the competitive level, the value of new spectrum rights would simply reflect the underlying scarcity value of the airwaves. That is, the future value of new frequency assignments would be about the same as the current value of existing license rights, on a per-MHz basis.

Instead, we find quite a different situation. The estimated values for new licenses for wireless telephone suppliers are but a small fraction of the value of current licenses. Indeed, cellular

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55 Of course, incumbent firms do not explicitly argue against competition. Rather, they engage in lobbying efforts to complicate (and thereby delay) regulatory decisions, and to impose rules or constraints on new firms which raise their cost of entry. Hence, the sources cited here as noting the efforts of the cellular industry to deter competition are perfectly consistent with public statements by the cellular industry that it welcomes competition. See Robert Bork, *The Antitrust Paradox* (New York: Basic Books; particularly Chapter 18, "Predation Through Governmental Processes"); and Thomas G. Krattenmaker and Steve Salop, "Anticompetitive Exclusion: Raising Rivals' Costs to Achieve Power Over Price," *Yale Law Journal 96* (1986), pp. 209-95.

56 Greenberg & Lloyd, p. 23.

telephone licenses are so valuable that they dwarf the market capitalization of all other bands along the spectrum. For instance, the market value of the entire 400 MHz block of spectrum devoted to off-air broadcasting (AM, FM, UHF-TV, VHF-TV), is put at about $11.5 billion.[57] By contrast, the NTIA estimates shown above indicate that the market value of the 50 MHz cellular telephony band is worth over $80 billion.[58] As the CBO notes: "Unlike cellular telephone service, broadcasting is already a highly mature, highly competitive industry. In this environment, the spectrum allocated for commercial broadcasting is stripped of most of the excess profits that underlie the value of the spectrum allocation for cellular telephone service licenses."[59]

What is even more important is that estimates for the value of additional spectrum rights are seen as dramatically lower than current cellular telephone license values because the new licenses would, of necessity, operate in a more competitive marketplace. In forecasting the revenue that two new 25 MHz nationwide[60] licenses for cellular telephone would bring at auction, the Congressional Budget Office set a range of between $1.3 billion and $5.7.[61] This is only a small fraction of the estimated value of the two current 25 MHz cellular telephone nationwide licenses. The CBO report notes that the striking difference is attributable to changes in market structure: "NTIA calculated the nationwide estimate of $80 billion... It incorporates the value of the existing duopoly regulatory structure, and thus would have to be adjusted downward if conditions

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57 CBO, p. 37. This is based on 1990 sales data.

58 Including the RSAs, about $90 billion.

59 *CBO, p. 37.*

60 Either the two licenses would be nationwide in scope, or the value estimates refer to the sum of license values assuming two per market.

61 CBO, p. 33.

closer to a competitive market were to be created by new entrants."[62] It goes on to explain the impact of new competition, which auctioning new licenses would presumably entail, in the following way:

> *Competition is the factor that has lead CBO to discount the information provided by acquisitions and stock prices in formulating an estimate of auction revenues. As NTIA recognized in its own analysis, a substantial part of the value evident in acquisitions and stock values can be attributed to the prevailing market structure.*[63]

Further, CBO's analysis cites the identical framework used by NTIA in estimating spectrum values:

> *If additional competitors were to enter the market the profits of cellular providers would presumably fall (i.e., monopoly rents would drop), so that the value of spectrum devoted to cellular uses would likely be lower.*[64]

Kwerel & Williams reach precisely the same results in their study of cellular entry. While the two existing firms in the Los Angeles cellular market enjoy market values of $3.06 billion, a new third firm entering the market would be worth just $253 million, net of all costs.[65] The pronounced drop (more than 90%) in capital value is a reflection of the high level of duopoly prices compared to those which would likely prevail under triopoly (three firms). All of which attests to the underlying market power of the cellular incumbents.

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62 *Ibid.*, p. 36.

63 *Ibid.*

64 NTIA, p. 91.

65 Kwerel & Williams, p. 86.

7 Conclusion.

In every aspect of the analysis, both theoretical and empirical, there is reason to believe that cellular telephone companies set prices far above costs. The theory of duopoly pricing certainly leads us to expect such, particularly in a market in which competitive entry is not simply difficult but is prevented by law. Hence, modifications of duopoly behavior such as limit pricing, vertical integration, or long-term contracting with potential entrants will not obtain. This is a classic case of duopoly market structure.

The evidence all points to the performance indicated by the theory. It is clear that telephone service prices are set well above costs, producing net profits which account for at least half of all revenues. Capital markets verify this interpretation, as investors bid prices for cellular telephone companies which are far in excess of capital replacement costs. Such prices make sense only where supra-competitive prices can be charged consumers. A more benign interpretation of such high profitability, that cellular firms exhibit unique entrepreneurship, is entirely implausible. Not only is the Q ratio evidenced too high for such an explanation, it is seen across the entire industry. Indeed, it is witness in the market for FCC licenses where individual firms haven't a chance to demonstrate innovative behavior.

Supporting evidence for the market power hypothesis abounds. It is clear that new entry would reliably have the effect of lower service rates, a reliable indication that such rates are now set above competitive levels. Further, the best forecasts concerning the value of new licenses all project that market entrants will pay far less than current incumbents, a sure sign that incumbents have paid to acquire market power. Finally, incumbents have demonstrated a readiness to oppose new entry through the lobbying process, telltale evidence that they have substantial rents to protect from new competitors.

Revealingly, cellular companies have themselves been quick to assert claims that the market power resultant from the FCC's current two-to-a-market licensing scheme raises rates in cellular telephony. On the legal theory that license values are exempt from state property tax assessments, cellular industry lawyers have introduced their own evidence that the overwhelming proportion of the market value in cellular systems stems not from investment in plant, equipment, and marketing effort, but rather from the duopoly market structure enforced by federal policy. All the independent evidence amassed on the subject would support them on their economic assertion.

8 Author's Biography.

Professor Hazlett teaches economics and public policy at the University of California, Davis where he is Associate Professor of Agricultural Economics and Director of the Program on Telecommunications Policy at the Institute of Governmental Affairs. In 1991-92 he served as Chief Economist of the Federal Communications Commission in Washington, D.C., and in 1990-91 he was a Visiting Scholar at the Columbia Institute for Tele-Information at the Columbia University Graduate School of Business.

Hazlett received his doctorate in economics from U.C.L.A. in 1984, and has written widely for both scholarly and popular audiences. He has taught courses in microeconomic theory, financial management, and public policy at the graduate and undergraduate levels. His academic work focuses on government regulation and the economic analysis of legal institutions, particularly in the telecommunications sector. He has testified as an expert witness on cable television regulation in various federal courts, and has been a consultant to both private firms and government agencies on regulatory policy concerning the cable television, telephone, and cellular telephone industries. His book entitled, *The Political Economy of Radio Spectrum Auctions*, is soon to be published by the MIT Press.

Hazlett's research has appeared in such publications as the *Journal of Law & Economics, Economic Inquiry, University of Pennsylvania Law Review, Yale Journal on Regulation, Contemporary Policy Issues, Telecommunications Policy, Managerial & Decision Economics, Southern Economic Journal, Harvard Journal of Law & Public Policy, Regulation*, and *The Public Interest*. Additionally, Dr. Hazlett is a frequent contributor to general interest periodicals, including the *New York Times, Wall Street Journal, Los Angeles Times, Chicago Tribune, San Francisco Chronicle, The New Republic, Across the Board*, and *The Economist*. He is a columnist and contributing editor for *Reason Magazine*, and has been a nationally syndicated commentator on both "Byline," distributed by Associated Press Radio, and "Marketplace," heard on the American Public Radio network. Hazlett is a member of the Mont Pelerin Society, and was the 1990-91 Wriston/Citicorp Fellow, an award given annually by the Manhattan Institute to a young scholar working in the field of public policy.

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September 14, 1993

BY HAND DELIVERY

The Hon. James H. Quello, Chairman
Federal Communications Commission
1919 M Street, N.W., Room 814
Washington, D.C. 20554

Re: General Docket No. 90-314; Errors in Time Warner Analysis of Cellular Rents

Dear Chairman Quello:

On August, 27, 1993, Time Warner Telecommunications, Inc. ("Time Warner") filed with the Commission a report prepared by Dr. Thomas W. Hazlett entitled Market Power in the Cellular Telephone Duopoly. The study purports to show that cellular telephone operators, as a result of the FCC's duopoly licensing scheme, possess a high degree of market power that allegedly allows them to set prices significantly above competitive levels. Time Warner offers the study to support its more general positions that the FCC should 1) allocate PCS spectrum in huge 40 MHz chunks, and 2) prohibit cellular licensees from bidding on PCS assignments inside their service territory.

In response to the Time Warner filing, Bell Atlantic Personal Communications, Inc. ("Bell Atlantic") is filing the attached paper prepared by Dr. Charles Jackson and Dr. John Haring entitled Errors in Hazlett's Analysis of Cellular Rents ("Jackson/Haring Paper"). The Paper shows that the Hazlett analysis is simply wrong on both theoretical and empirical levels. Jackson and Haring illustrate that the theory of duopoly pricing propounded in the Time Warner piece actually predicts fully competitive outcomes, and leads to the conclusion that rents in cellular telephony "can only reflect scarcity of spectrum rather than market power."

While allegedly espousing competition, Time Warner has consistently argued for a version of PCS that would result in no more than two 40 MHz "mega"-licensees, rather than a plan that would permit a large number of licensees --

encompassing many different kinds of technology and infrastructures -- to compete in the emerging PCS marketplace. This point is made in the Jackson/Haring critique of the Time Warner analysis, as the authors conclude that the appropriate number and identity of efficient PCS suppliers should "be left to the market to determine":

> Time Warner evidently has a different view. They want Government to decide the optimal configuration of supply and suppliers. Hazlett talks about the desirability of open entry, but it is Time Warner that has consistently opposed open entry. Hazlett talks about the desirability of more competitors, but it is Time Warner that would have Government limit the number of competitors. And it is now Time Warner proposing that Government exclude an important class of potentially efficient suppliers from competing. Exclusion would certainly reduce the size of the bids Time Warner has to make to acquire PCS licenses and remove many potential competitors with formidable talents and capabilities from the competitive fray. The question is whether <u>those</u> results would be in the public interest.

Jackson/Haring Paper at 9 (emphasis in original).

We hope that this submission will prove helpful to the Commission as it proceeds to finalize its service rules for PCS, and considers the benefits of open eligibility and the concurrent benefits of a large number of PCS licenses.

Very truly yours,

Gary M. Epstein
Counsel for Bell Atlantic
Personal Communications, Inc.

Enclosure

cc: Distribution

ERRORS IN HAZLETT'S ANALYSIS OF CELLULAR RENTS

John Haring
and
Charles L. Jackson

STRATEGIC
POLICY
RESEARCH

ERRORS IN HAZLETT'S ANALYSIS OF CELLULAR RENTS

JOHN HARING

AND

CHARLES L. JACKSON

SEPTEMBER 10, 1993

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ERRORS IN HAZLETT'S ANALYSIS OF CELLULAR RENTS

JOHN HARING
AND
CHARLES L. JACKSON[1]

Introduction

Dr. Thomas W. Hazlett has submitted theoretical and empirical evidence to the Commission which he claims conclusively proves the existence of market power in cellular telephony.[2] Hazlett's theory and evidence are both wrong. The theoretical model he propounds actually leads to the conclusion that rents in cellular telephony can only reflect scarcity of spectrum rather than market power.

Hazlett's empirical analysis is similarly flawed. The q-ratio evidence he adduces can be entirely explained on scarcity grounds and be completely consistent with competitive behavior. Unlike the cable television industry, where high q-ratios can *only* be explained by monopoly pricing behavior, cellular telephony is *not* a monopoly and monopoly, *per se*, is thus not even a potential explanation for the existence of high q-ratios.

Hazlett confounds the separable concepts of scarcity and monopoly rent and simply asserts that observed rents reflect effective exercise of market power. He offers no behavioral evidence that cellular duopolists collude to restrict output and cannot prove that the cellular market is in anything approaching equilibrium. Instead, all he offers is a theory of pricing under duopoly. Ironically, the theory he offers predicts fully competitive outcomes.

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[1] The authors are principals in Strategic Policy Research, Inc., an economics and telecommunications policy consulting firm located in Bethesda, Maryland. Haring formerly served as Chief Economist and Chief, Office of Plans and Policy, at the Federal Communications Commission. Jackson was formerly the Staff Engineer with the House Telecommunications Subcommittee and engineering assistant to FCC Commissioner Glen O. Robinson.

[2] *Market Power in the Cellular Telephone Duopoly*, A Report Prepared for Time Warner Telecommunications (August 1993).

Duopoly Pricing

The characteristics of market equilibrium when few firms compete are indeterminate. Monopoly outcomes are possible. Competitive outcomes are possible. Results depend on how firms interact. Thus, different assumptions about strategic interaction among competitors yield different solutions. When the behavior of firms is interdependent, determinate solutions "fade into a mist of interacting uncertainties."[3] As Professor John S. McGee of the University of Washington has observed:[4]

> Depending upon which theory one chooses, increasing the number of firms may *increase* prices (even above the single firm monopoly level), may lower prices, or may leave prices unchanged.

Hazlett proposes to analyze duopoly pricing using a Cournot model in which price is the decision variable of the firm. As Hazlett describes the equilibration process, firm 1 initially sets a monopoly price, firm 2 then sets a lower price, firm 1 then sets a new price which is lower than monopoly and the process continues until, assuming firms are symmetrically situated, both firms set identical levels and, therefore, have no tendency to change. This is an equilibrium in the sense that neither firm has an incentive to change its behavior so long as the other firm does not alter its behavior.

This variant of the Cournot model is usually attributed to Bertrand, who first produced the result more than 100 years ago.[5] The problem for Hazlett is that, if firms behave this way, fully competitive equilibrium is the outcome. As Professor Jack Hirshleifer of UCLA remarks in his college price theory textbook:[6]

> The key point here is that, given homogeneity of product, the firm quoting a lower price will (however small the differential) attract *all* the

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[3] See Jack Hirshleifer, *Price Theory and Applications* (1976, pp. 323-325).

[4] "Competition and the Number of Firms" in *In Defense of Industrial Concentration* (1971, p. 74) (emphasis in original).

[5] Joseph Bertrand, "Theorie mathematique de la richesse sociale" (review), *Journal des Savants* (September 1883).

[6] *Op. cit.*, p. 328 (emphasis in original).

> customers. Then the Cournot solution becomes impossible, or, rather, it coalesces with the Competitive solution. Whatever the *price* chosen by firm 1, firm 2 will optimally react by setting a price just infinitesimally lower. There is then no stable outcome short of . . . the Competitive solution.

To state the matter bluntly: *If cellular firms behave according to the theory propounded by Hazlett, the fully competitive equilibrium results.* Under these circumstances, any rents must reflect scarcity rather than effective exercise of market power.

Hazlett cites use of a Cournot model by FCC staffers Evan Kwerel and John Williams in an OPP Working Paper.[7] The variant of the Cournot model Kwerel and Williams utilize (and the one Hazlett presumably has in mind, although misstates)[8] assumes output rather than price is the decision variable. This model predicts that price and output will approach competitive equilibrium asymptotically as the number of firms increases.[9] In the absence of a demand model, Kwerel and Williams use this result as a purely mechanical construct *to artificially simulate* the effects of an increase in supply. Their estimate has no grounding in actual empirical reality; indeed, lacking an estimated model of actual marketplace demand, they are unable to attribute any price effects to a simple increase in supply relative to demand.

This variant of the Cournot model is also generally held in low regard by economists precisely because it is a purely mechanical construct and has no grounding in economizing

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[7] "Changing Channels: Voluntary Reallocation of UHF Television Spectrum," Federal Communications Commission: OPP Working Paper 27 (November 1992).

[8] Hazlett has firms setting prices given outputs. In the Cournot model firms choose output levels given output levels; in the Bertrand variant of the Cournot model, they set prices given prices. When price is the decision variable, Cournot and Competitive equilibria converge.

[9] Hazlett produces a table (his Table 1) illustrating this effect. Interestingly, what that table reveals is that, if competitors are playing the Cournot game, duopoly is *very different* from monopoly and practically competitive results emerge even when the number of sellers is not really very large. Hazlett *himself* has argued strenuously that duopolistic competition in the cable industry makes a big difference in terms of lowering cable's monopoly prices. As he has stated, "It is clear that [cable] prices are suppressed by duopolistic entry . . . . It cannot be seriously doubted that duopoly represents a significant consumer surplus gain over monopoly. *See* "Duopolistic Competition in CATV: Theory, Practice, and Policy" (October 20, 1987), p. 38. Nonetheless, Hazlett now maintains that cellular duopolists are effectively colluding to restrict output — in a market in which output has actually been growing by nearly 40 percent a year.

behavior by individual agents.[10] Players in Cournot's game are assumed to be stupid and to persist in premising their behavior on assumptions their own experience repeatedly reveals are invalid — they never learn from their mistakes. As one of the leading modern students of Cournot's ideas observes:[11]

> Cournot's players persist in behavior which reveals the untruth of the assumptions which prompted the behavior in the first place. Rational players, by comparison, would come quickly to anticipate each other's reactions and would alter their behavior until events confirm (rather than deny) their expectations.

Interestingly, the one variant of the Cournot model not subject to this criticism is that attributable to Bertrand to which we allude above. Bertrand's players premise their behavior on an assumption about their rival's behavior, which *is* confirmed in the event — each assumes the other will behave competitively so both conclude it is in their best interests to behave competitively: in behaving competitively their expectations are thus borne out.

An apt and accurate appraisal of the state of economic wisdom on this topic has been provided by Professor Harold Demsetz of UCLA, who, Hazlett's views notwithstanding, remarks that:[12]

> *We have no theory that allows us to deduce from the observable degree of concentration in a particular market whether or not price and output are competitive* (emphasis in original).

Since theory is Hazlett's *only* basis for arguing that observed rents are the product of duopolistic output restriction, his case thus fails. He can tell a story, but there are lots of stories that can be told, consistent with observation, and that is really the point. The fact that the story he tells is actually *inconsistent* with a competitive market failure underscores the errors in his analysis.

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[10] It would be extremely amusing to hear Hazlett try to explain *why*, in the Cournot model's terms, the competitive equilibrium is approached asymptotically as the number of firms increases.

[11] James Case, *Economics and the Competitive Process* (1979), p. 31.

[12] "Why Regulate Utilities?," *The Journal of Law and Economics*, XI (April 1968), pp. 59-60.

The Burden of Proof

Hazlett's and Time Warner's case for excluding an important class of potential PCS competitors is that there is and will (after PCS licensing) continue to be a market power problem. Yet, if they cannot demonstrate that there is or would be a problem of market power, they have no basis for excluding competitors. Hazlett has failed to demonstrate that a competitive market failure now exists. He has not attempted to demonstrate there would be a competitive market failure after licensing. Given the number of technically feasible competitors, a competitive market failure is unlikely in that event and Hazlett would likely concede as much.

Q-Ratios

Given the cable industry's previous positions regarding the meaning and relevance of *q*-ratios as a measure of market power, Time Warner's embrace of this concept is refreshing and not a little ironical.[13] The weight Hazlett attaches to cellular firms' having argued that the value of their operating systems is mostly embodied in the value of an intangible asset (the FCC license) is particularly striking is this regard. Cable firms have made precisely the same argument in precisely the same context (*i.e.*, for purposes of tax assessment), the only difference being that cable firms cite their *monopoly franchises* as the intangible asset, while, of course, simultaneously maintaining in other forums that they have no monopoly power.

Consider, for a moment, the differences between an FCC cellular license and a local cable monopoly franchise. The local cable franchise with very few exceptions conveys an effective *monopoly*. An FCC cellular license does *not* convey a monopoly. The opportunity costs of the resources embodied in a cable monopoly franchise are quite small (*viz.*, *e.g.*, foregone benefits from alternative use of rights of way). The opportunity costs of the resources embodied in an FCC cellular or PCS license are huge, as the FCC's experience in finding spectrum for PCS confirms with a vengeance. Three conclusions can be drawn from this comparison: (1) Scarcity of the resources embodied in a monopoly cable franchise

[13] Hazlett's positions regarding the cable industry's high degree of monopoly power and the virtually complete ineffectiveness of *current* government regulations to control that power are well known to the Commission.

cannot account for cable's high q-ratios;[14] (2) Monopoly power can and does account for cable's high q-ratio, a conclusion with which Hazlett himself agrees; and (3) Monopoly, *per se*, cannot account for high q-ratios in cellular.

Before examining the causes and policy implications of high q-ratios in cellular, we first correct the *measurement errors* in Hazlett's submission and note the extent to which he plays fast and loose with the numbers.

Hazlett estimates that cellular firms have a capital investment of $500 per subscriber. This estimate is substantially lower than the industry rule-of-thumb estimate of $1,000 per subscriber and the survey estimates published in one of the trade's standard reference sources.[15] Leibowitz, *et al.*, put the average investment per subscriber and the average incremental investment per cellular subscriber at significantly more than twice Hazlett's estimate (see table below). Leibowitz, *et al.*, also give an estimate of marketing costs per subscriber. Their estimate (for 1994) is $500 per subscriber. If one takes the *lowest* value given by Leibowitz, *et al.*, for capital investment per average subscriber and add their $500 estimate of marketing costs, one obtains a total investment of $1,670 per subscriber. This value is more than *twice* the number used by Hazlett in his analysis.

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[14] As Professor Paul W. MacAvoy noted in his submission to the Commission's Notice of Inquiry on cable, "The high q cannot be indicative of economic rents, which occur when the firms control scarce specialized factors of production, because cable utilizes no such scarce factors of production to that extent." See *Tobin's q and the Cable Industry's Market Power* (March 1990, p. 35). Cellular firms obviously do control a highly scarce factor of production, the spectrum they utilize, and this provides an obvious explanation for high q-ratios. Professor MacAvoy (p. 35) cites broadcasters ("Broadcasters have high q ratios, largely because they control scarce spectrum.") as a case where scarcity rents are the source of high q-ratios.

[15] Dennis Leibowitz, Joel Gross, Eric Buck and Frederick Moran, *The Cellular Communications Industry* (Winter 1992-1993 Edition), Donaldson, Lufkin and Jenrette, New York 1993.

CAPITAL INVESTMENT IN CELLULAR			
	DLJ Survey Date		
	June 1991	December 1991	June 1992
	----------(Dollars)----------		
Capital investment per average subscriber	$1,311	$1,290	$1,170
Incremental investment per incremental subscriber	1,210	1,167	765
Hazlett (Note: Hazlett did not survey cellular systems to obtain information on capital investment)	500	500	500

Hazlett calculates the profitability of cellular operations on the assumption that investment is recovered over 10 years with a return of 10 percent. For marketing investments, recovery should be calculated on the expected customer life. In the cellular industry, the average customer life is 40 months, *not* 10 years.[16] While the proper recovery term for investment in physical capital is less clear, the idea that any investment in electronics should have an economic lifetime of 10 years is mind-boggling given the rapid pace of technical innovation in that industry. Our own view is that a lifetime of 5 years more properly reflects the likely decline in economic value of cellular plant.

If we use the Leibowitz, *et al.*, estimates and the more appropriate lifetimes we suggest (40 months and 5 years) for marketing and capital investments, respectively, but sticking with Hazlett's 10 percent return, the estimated monthly capital expense is roughly *four times* as high as Hazlett suggests ($39.61 compared to $10.57). Following Hazlett's analysis, and subtracting our estimate of capital expense from cash flows, we obtain a profit per subscriber per month of $20.39 — about 20 percent of revenues and half the level of capital expense. Hazlett claims that ". . . cash flows are nearly five times the level of capital

[16] MTA/EMCI, **Third Quarter CELLTRAC, 1992 Results**, November 17, 1992, shows a churn rate of 30.4 percent annually which corresponds to a 39.5 month average customer tenure.

expense: clear evidence that cellular duopolies exercise market power by charging rates in excess of competitive levels." More realistic cost estimates suggest that the evidence is anything but clear.

Hazlett's presentation of evidence on cellular industry q-ratios is not candid. Hazlett uses data from an NTIA study to calculate q-ratios.[17] He states (page 15, emphasis added) that:

> The 1991 NTIA Report deduced *the present value of duopoly profits* as established by the financial markets, at nearly $80 billion.

Hazlett thus has NTIA trying to estimate profits from duopolistic output restriction, while the NTIA *itself* states that its goal was more inclusive. According to NTIA, its goal was (D-1):

> . . . to estimate the current value of a particular portion of spectrum used for a designated purpose.

Note also that NTIA provides *two* estimates of the value of cellular ($80 billion and $46 billion), the lower one of which has simply *disappeared* from Hazlett's presentation of the evidence. The estimate he ignores is nearly *half* the estimate he uses. In such circumstances, Hazlett's conclusion that the evidence is "overwhelming" rings hollow.

Hazlett is, in truth, playing games. We could duplicate his analysis and show that any real estate developer has an enormous q-ratio. All we would have to do is look at a development in its early days and *ignore* the cost of real estate. The market value of the developer includes both the value of the real estate at its future use supporting developed properties and the value of the few buildings built on the development so far. But, the tangible capital investment consists of only those few buildings. Hence the q-ratio (the value of everything divided by the value of the buildings) is enormous. In the same way, calculating the q-ratio of a cellular firm excluding the value of its "real estate" — its radio licenses — ignores the most important element in the value of the firm.

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[17] *U.S. Spectrum Management Policy: An Agenda for the Future* (February 1991).

Conclusion

In a market system, prices serve two functions: they ration available supplies and they signal whether an expansion or contraction of supply is warranted. When demand for a product increases relative to supply, its price will rise and the profits of existing suppliers will rise. The ratio of these firms' market value to the replacement costs of their productive assets will rise. Note that we have made, indeed need make, no mention of monopolistic output restriction or any arcane theories of duopolistic exploitation to explain these phenomena. The simplest theory of supply and demand fully suffices. What these market signals imply is that additional resources should be allocated to supply of the product whose price has risen.

Every marketplace signal of which we are aware indicates that the FCC should substantially increase the amount of spectrum available for use in wireless telecommunications and utilize methods to assign rights of spectrum resource usage (*e.g.*, auctions) that are likely to result in maximum productivity through award to the most efficient suppliers. We do not believe the productive capabilities of producers and the wishes and desires of consumers are properly regarded as facts the Commission can discover through the administrative process. It is only through the process of competition that these facts can be discovered. The appropriate number and identity of efficient suppliers should, in our view, be left to the market to determine.[18]

Time Warner evidently has a different view. They want Government to decide the optimal configuration of supply and suppliers. Hazlett talks about the desirability of open entry, but it is Time Warner that has consistently opposed open entry. Hazlett talks about the desirability of more competitors, but it is Time Warner that would have Government limit the number of competitors. And it is now Time Warner proposing that Government exclude an important class of potentially efficient suppliers from competing. Exclusion would certainly reduce the size of the bids Time Warner has to make to acquire PCS licenses and remove many potential competitors with formidable talents and capabilities from the competitive fray. The question is whether *those* results would be in the public interest.

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[18] Economic Nobelist Friedrich Hayek once observed that "[C]ompetition is valuable *only* because, and so far as its results are unpredictable and on the whole different from those which anyone has, or could have, deliberately aimed at." *See* "Competition as a Discovery Procedure," in *New Studies* (1978, p. 180) (emphasis in original).

The Cellular Service Industry: Performance and Competition

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